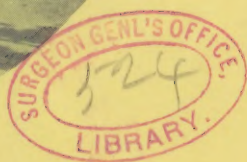


CONN (G. P.)
COMPLIMENTS OF THE AUTHOR.

Notes on the Sanitary Condition of Mexico.

BY
G. P. CONN, M. D.,
CONCORD, N. H.



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NOTES ON THE SANITARY CONDITION OF MEXICO.

BY G. P. CONN, M. D., CONCORD, N. H.

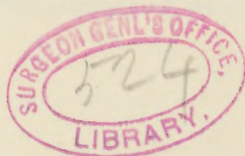
"The use of travelling is to regulate the imagination by reality, and instead of thinking how things may be, to see them as they are."—*Dr. Johnson.*

That the reader may comprehend some of the various difficulties the hygienist has to encounter when seeking for information in a foreign land, I will quote from the writings of two of our celebrated authors whose graphic description expresses the conditions far better than I should be able to do for myself.

It matters not that the one is an artist and brings out in words the ideal language of the canvas, while the other presents the cold, hard facts of the business man. Both are true to nature, only the point of observation was different.

The artist and business man may travel together and share each other's woes and blessings, and yet the cool financial observations of the one will partake of but little of the enthusiasm of the other.

F. Hopkinson Smith, in his "White Umbrella in Mexico," says, it is "a land of white sunshine, redolent with flowers, a land of gay costumes, crumbling churches, and old convents, a land of kindly greetings, of extreme courtesy, of open, broad hospitality. It was more than enough to revel in an Italian sun, lighting up a semi-tropical land, to look up to white-capped peaks towering into the blue, to look down upon wind-swept plains encircled by ragged chains of mountains, to catch the sparkle of miniature cities, jewelled here and there in oases of olive and orange, and to realize that to-day, in its varied scenery, costumes, architecture, street life, canals crowded with flower-laden boats, market plazas thronged with gayly-dressed natives, faded church interiors, and abandoned convents, Mex-



ico is the most marvellously picturesque country under the sun, a tropical Venice, a new Holy Land."

It has been said that Mexico is a land of altitudes. Her cities lie under a tropic sun, but their altitudes lift them to cooler and purer atmospheres, and make a veritable spring-time of even her summer days. The season in Mexico is all the year round; it never ends; the only difference between summer and winter is that it rains in the summer, and then only light showers.

The only information requisite, as to the weather, is: June to November, umbrellas for afternoon wear; December to May, the blue sky and the Republic of Mexico are *the only needed protection*.

William Elroy Curtis, in his "Capitals of Spanish America," says, "It wounds the pride of a Yankee tourist to discover that so little of our boasted civilization has lapped over into the borders, and that the historic halls of Montezuma are only spattered by the modern ideas which we exemplify. The native traveller still prefers his donkey to a railroad train, and carries his burden upon his back instead of using a wagon. Water is still peddled about the capital of Mexico in jars, and the native farmer uses a plough whose pattern is as old as that used in the



MEXICAN PLOUGH.

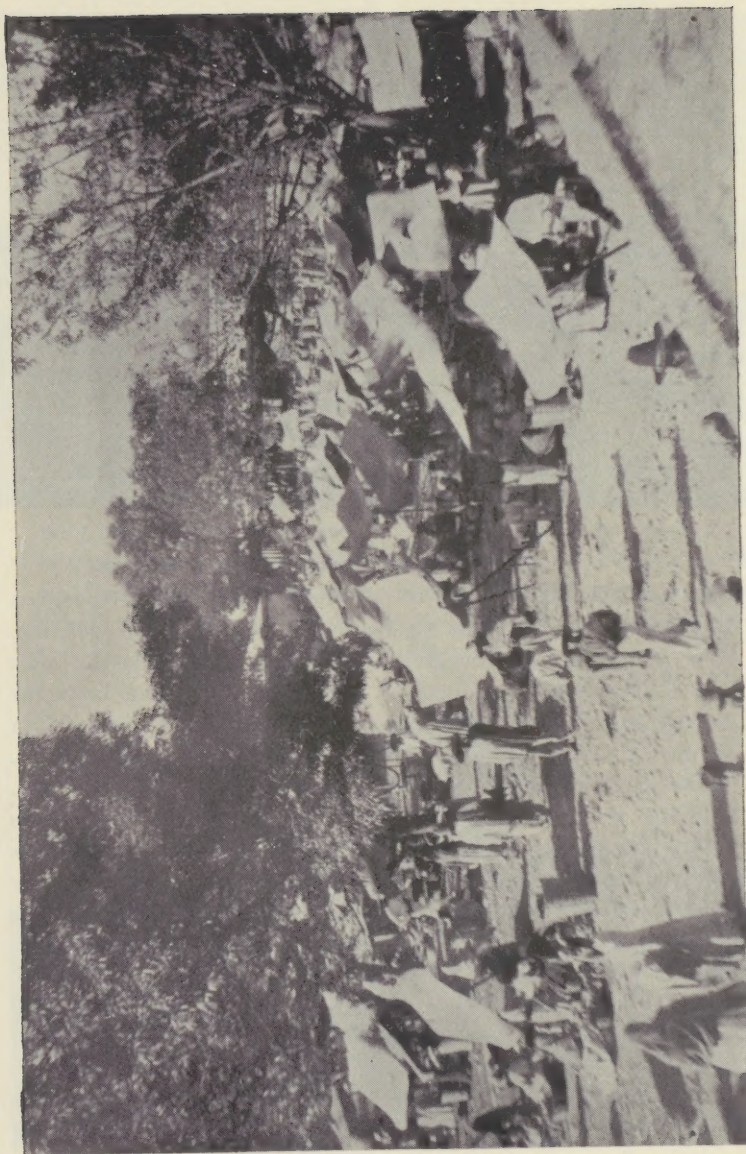


MEXICAN CART.

days of Moses. Nowhere do ancient and modern customs come into such intimate contrast as in the City of Mexico. The people are highly civilized in spots. Beside the most novel and recent products of modern science one finds the rudest and crudest implements of antiquity. Types of four centuries can be seen in a single group in any of the plazas. Under the finest walls, with ceilings frescoed by Italian artists, and the walls covered with the rarest paintings, one finds a common bar-room, where native drinks are dealt out in gourds and the pinõn stops to eat his tortillas. Women and men are seen carrying upon their heads enormous burdens through streets lighted by electricity, and stop to inquire, through telephone, where their load shall be delivered.

“In an old inquisition building, where the bones of Jews and heretics have been racked and roasted, is a medical college sustained by the government for the free education of all students whose attainments reach the standard of matriculation, and bones are now sawed asunder in the name of science instead of religion.”

The Mexican cart seems to be “fearfully and wonderfully



A MEXICAN MARKET SCENE.

made," and without question may be considered antique. As with the exception of a few places where mining or other labor is carried on under freight supervision, the same old pattern is in use, as was found doing business when Cortez demanded the surrender and subjugation of the Aztec Capital. The creaking of its huge wooden wheels as they revolve upon their axles is suggestive of the fact that no inconsiderable amount of the power in front of the vehicle, is expended in causing the revolution, and the tonnage transported must be small.

Such language represents some of the contrasts of a people inhabiting a country that was settled and conquered before the United States was known as the "land of the free." It presents an anomalous condition that must be kept in mind as we look upon the peculiarities it reflects when viewed from a hygienic stand-point. It is only when we consider this country, its people, and its peculiarities of climate that a Northern or Eastern man is enabled to satisfactorily solve in his own mind the problem of a good hygienic condition in Mexico.

While these quotations serve to give you some idea of the people and its climate, we must at the same time remember that in part it is the language of the enthusiastic artist, whose imagination was lighted up by the beauty of the scenery, while the other recites cold facts from the stand-point of a commission of investigation into possible commercial relations.

From a sanitary point of view we will consider the topography of the country. The contour of the surface is peculiar, for while the greater portion of it is of a higher altitude, yet its topographical character is of such a nature that large areas have no natural drainage outlets. On the high tablelands, it is the rule rather than the exception that rivers of considerable size will empty into a lake having no visible outlet. Again, rivers of considerable size, after flowing along for miles much the same as we should expect in New England, will at once disappear by being absorbed by the earth, and will not appear again for long distances, when they will come to the surface and apparently having been reinforced by other streams, for the volume of water will be far greater than at the place where last visible.

It may here be remarked that the central portion of the Mexican republic, and comprising nearly all except that portion lying directly adjacent to the Pacific Ocean or Gulf of California, on the west, and the Gulf of Mexico on the east, is higher than any part of the United States east of the Mississippi river except our highest mountains. The Mexican Central railroad, which carries one from El Paso, Texas, to the City of Mexico, 1,224 miles, has no point in its entire distance that is not more than 600 feet higher than our own Kearsarge mountain, while there are considerable distances on this line where the rails are from 1,000 to 2,000 feet higher than Mount Washington. With such high altitude, one might suppose that the drainage of the city might be easily affected. Unfortunately this is not true, and I think no city in the world has encountered more difficulty or been to greater expense, and still its drainage system is incomplete.

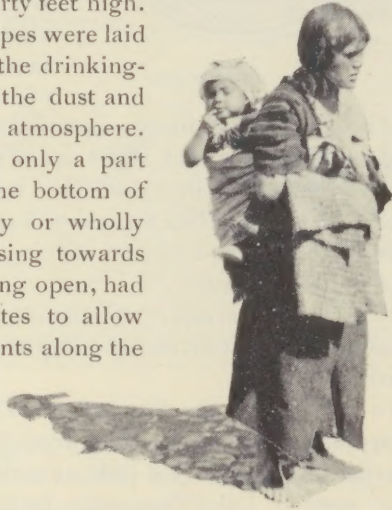
The reasons for this are mainly the topography of the country to be drained. You may observe that I speak of it as a country instead of a city, which is true, as the city is located near the centre of a plain more than forty miles in extent, and the foot hills are plains extending still farther, so that the basin is more than one hundred miles broad. This basin is completely surrounded by an unbroken chain of mountains, ranging from a few hundred to more than 10,000 feet above the level of the city; therefore, the natural water-shed of this whole section empties into this valley and its numerous lakes, some of which are actually higher than portions of the city. These are held back by dikes, like the waters in some portions of Holland, and nothing but this fact, and that the average rainfall for this basin is much less than we have in the United States east of the Mississippi, prevents its being inundated a considerable portion of the time.

Occasional inundations have taken place, and this has been a potent factor in causing its people to try to solve the problem of how the city shall be drained. The city was inundated in 1553, in 1580, in 1607, and from 1629 to 1634—five years—it remained under water. With lakes almost within the city limits that are on a higher elevation than the streets, you will expect the ground water to be higher than the surface,

and I believe it is allowed that the average for the year is less than four feet, although, until the dike was constructed around Lake Texcoco, the water came within about eighteen inches of the surface, and not infrequently found its way into the streets.

This surface water is impure, being discolored, and generally holding in solution large quantities of crude salts of soda.

The supply of water for the city comes from Chapultepec, and at this point I would add that not infrequently small mountains of porphyry seem to have been pushed up through on that plain, as well as in other parts of Mexico, undoubtedly by volcanic force, and generally good water is found somewhere in the fissures of this volcanic rock. The immense spring on Chapultepec is high enough for the water to find its way onto the city by gravity through an aqueduct constructed of stone and cement, supported on arches of the same material. There are two lines of aqueducts from this spring, which consists of open viaducts supported on arches, these arches being part of the way thirty or forty feet high. Some ten years ago iron pipes were laid in this viaduct to conduct the drinking-water and secure it from the dust and other impurities of the atmosphere. These iron pipes conduct only a part of the water, and lie in the bottom of the open viaduct partially or wholly covered by the water passing towards the city. This viaduct, being open, had to be levelled, and had gates to allow the water to be used at points along the way for irrigating purposes. These volcanic mountains are isolated, and generally not more than a mile or two in circumference at the base, and in shape somewhat resembling the pinnacle at Hooksett. The original site of the city was on a small peninsular in the midst of a lagoon of salt



CHAMULA MOTHER AND CHILD.

water, and was found to be liable to be inundated whenever there was an extra rainfall.

We are informed by historical works that the original Aztec population were intensely religious and probably superstitious in character, and believed they were to migrate from place to place until they saw a sign which was to be to them significant of the place of their habitation. This sign was to be an eagle holding a serpent in its bill or talons, and resting upon a cactus.



SEAL OF MEXICO.

After nearly two centuries of migrating hither and thither through the country, much of the time fighting for their lives among their enemies, they came upon this sign in their imagination, and founded the city on that spot. It is in latitude $19^{\circ} 25'$ north and longitude $99^{\circ} 5'$ west of Greenwich. I would add that this sign they sought for so long became the national emblem of the Republic of Mexico.

An island was formed in 1466 by Montezuma the First, who had a dike constructed about seven and a half miles in length and sixty-five feet in thickness to hold back the waters of the lake. This island was formed in Lake Texcoco.

In 1519, Cortez captured the city, but was obliged to vacate in about seven years.

It is hardly necessary to remark that the city in its present condition is not considered a healthy one, having a very large death rate.

In 1607, about the time of the settlement of Jamestown, a plan was considered to carry away the surplus waters so as to prevent inundation; but little or no thought was taken of making a sewer. Lake Zumpango being the highest of six lakes, the canal through the Nochistongo cut was expected to carry away the surplus water which formerly had flown into the lake in which the city was situated, but it was not considered feasible to carry this cut deep enough to drain the lower lakes of the

city. This cut, which was completed during that century, carried off the surplus water for a few weeks, when it was undermined, and caved in. Repeated attempts have been made to open it, but they have not succeeded in carrying it down to its original level.

There are no fire-places, furnaces, or stoves in the city, all cooking being done in the old-fashioned Dutch oven, with a charcoal fire.



TURKEY BUZZARDS.

As a scavenger all through Mexico, the turkey-buzzard takes the first rank, as in our southern states, and the government imposes a fine on any one slaughtering them.

The Spanish moss or lichen grows on nearly all large trees, and reminds one of our southern states. The eucalyptus grows in a thriving manner wherever it is planted.

The present canal and tunnel for the drainage of the city is



DREDGER.

a modification of Enrico Martinez's Nochistongo cut, and was planned by Captain Smith, of the American Engineer corps, in 1849. The canal and tunnel when complete will be a little more than thirty miles in length, of which the tunnel represents nearly one tenth. The location of the tunnel is under what is called the "saddle in the mountain," which represents the shortest distance through from side to side. The cut was commenced in 1879, or nearly forty years after it was first proposed, at the farthest extremity, and it is a portion of the tunnel.

Political agitations have been the bane of the country, and put a stop to the work. Little more was done until 1885, when the council of the city and the federal government combined to consummate this important sanitary work. A commission was appointed who have had charge of the work, and who have directed its execution. A loan was contracted in London for about \$12,000,000, which has served to cover the cost up to the present time, and probably no trouble will be experienced in raising sufficient funds to complete the plan. A rough description of this work would be to describe it as an open ditch or canal, having a depth of from 15 to nearly 100 feet, and a width averaging 40 feet on top, with the ordinary slope of sides, capable of carrying away eighteen cubic metres per minute. The object is, first, to carry the sewerage from the city, and, second, the surplus waters which can be used to flush the canal. The latter will be very necessary, as the grade of the canal is only about one foot to the mile, being less than thirty-six feet in the whole distance. I use the words "surplus waters" in the reason that all portions of that plain are very productive when water is used for irrigating purposes, consequently it becomes necessary to obtain water at a certain depth in order not to destroy the basin or plain for agricultural pursuits. The work has been actively prosecuted since 1885, and it is hoped that it may be completed in 1894. Over 5,000 men are employed in this work, and five immense dredgers, some of them nearly as large as those used on the Panama canal. Each dredger is a complete outfit by itself, as it has its own motive power; its dynamos for electric lighting; its dormitories and dining rooms for the workmen, and with relays of men, is prepared to push the work during the whole twenty-four hours.

As will be observed in the illustration, a narrow-gauge railroad had been constructed along the side of the canal.

This was rendered necessary for the transportation of material and supplies, and over twenty miles had been built for that purpose.

Three locomotives were employed, and over the mountain all of them were required to move heavy trains.

The contract has been let to an English firm by the name of Pearsons & Son, who have bound themselves to complete the canal by the month of September, 1894. These contractors are carrying out the work of the canal in two different manners,—namely, by hand-work with centrifugal pumps to draw off the water which filters in the tunnel, and by means of the dredgers I have mentioned, which have a capacity for 3,000 cubic metres of excavation per day, and which deposit the earth and water excavated at a distance of more than 200 metres from the centre of the canal. This is accomplished by means of the buckets of the dredgers like an elevator carrying the earth and the water to a height of about sixty feet, where it empties into a chute, and the mud and water flow through the horizontal shafts which extend several feet beyond the sides of the canal. As the earth which has been excavated falls upon the sides of the canal, enough water falls with it, so that it becomes a solid bank, and in places where the canal passes through lakes, this earth is thrown up upon the sides, and becomes a dike to keep the water of the canal from flowing into the lakes. At the same time, flumes are constructed through this dike, where by raising a gate the surplus water and overflow of the lake can be run into the canal for the purpose of flushing.

In the construction of this canal twenty-three overhead structures are required, five of them being aqueducts to carry rivers, four are bridges for railroads, the rest being for main roads or private ways. These are all constructed of masonry, and some of them, especially just before we reach the tunnel, will be of great expense by reason of their perpendicular elevation. The tunnel commences where the depth of the canal is nearly eighty feet, and I understood the “saddle of the mountain,” where the tunnel passes through, to be a little more than 300 feet

above the level of the mason work of which the tunnel is constructed.

The streets in the city of Mexico are kept fairly clean, as a large force of men are employed to sweep the streets and remove the garbage. This is utilized by being carried away for fertilizing purposes.

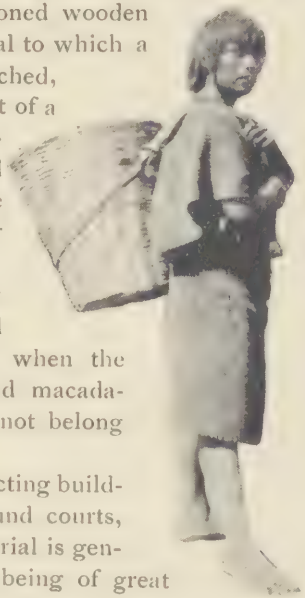
The watering of the streets and plazas is done by men with buckets, or the old-fashioned watering pots. Generally you would see men with an old-fashioned wooden pail with a bail of the same material to which a short piece of rope would be attached, which served to bring the water out of a ditch or cistern, when with a dexterous movement of the arms and wrists he would convert the whole pailful of water into a small shower to sprinkle the street.

I only saw one street-sprinkler while in the city, and that was used on the "Paseo de la Reforma," when the street was being reconstructed and macadamized, and I question if this did not belong to the contractor.

The prevailing method of constructing buildings is and has been to build around courts,—patios,—and as the building material is generally stone or cement,—the walls being of great thickness—the rooms are frequently cold and cheerless. Very little lumber enters into the construction of buildings, even the floors being generally of stone or clay.

Scarcely any chimneys are to be seen, and no fire is used except in cooking.

The climate, as described by Hopkinson Smith in the quotation which I read, is scarcely exaggerated, but were it not that a cloudless sky is present every day in the week from October to May, it would be dismal in the extreme, for at this altitude it all depends upon sunlight, as during a single night the temperature will fall to 40° F., and sometimes even lower. There



CARRIER.

is always great change between the temperature during the day and at night, but with this constant sunlight during every day in the winter, any one must be difficult to please who cannot enjoy its soft atmosphere.

The air is very dry, and one for a time suffers from thirst, but gradually we become accustomed to its effects, and afterwards no not mind or think much about it. This dry atmosphere, and the evaporation it occasions, is a potent factor in the sanitary condition of the city and country, as it extracts moisture from all inanimate substances very rapidly, therefore many things that if left to themselves in New England would become a decided nuisance, simply become a dried fibre or mass in Mexico that gives out no odor.

In regard to the possibilities of Mexico, it is but justice to say that progressive sanitary improvements may be found in almost every section, and it will not be long before one will find good drainage and good water in all large towns and cities, and I suspect it will not be very long before one will find the Yankee stove on duty in almost every well-regulated household, and while these improvements will take away much of the charm and novelty of travelling through this unique and strange land, it will be the means of affording much comfort to the invalid and tourist.

I have heard this country compared with the old cities of Southern Europe, Asia, and Africa, and who knows how much they are the junior of some of those places. I cannot better illustrate my meaning than to use the following quotation, which I picked up in Mexico, but am not certain of the author's name.

“World wrongly called the New: this clime was old
 When first the Spaniard came, in search of gold:
 Age after age its shadowy wings had spread,
 And man was born, and gathered to the dead:
 Cities arose, ruled, dwindled to decay;
 Empires were formed, then darkly swept away;
 Race followed race, like cloud-shades o'er the field,
 The stranger still to strangers doomed to yield.
 The last grand line that swayed these hills and waves,
 Like Israel, wandered long 'mid wilds and caves,

Then, settling in their Canaan, cities reared,
Fair Science wooed, a milder God revered,
Till to invading Europe bowed their pride,
And pomp, art, power, with Montezuma, died."

NOTE.—The author is under obligations to the editors and publishers of *The Granite Monthly* of New Hampshire and *The Engineering Magazine* of New York for a portion of the plates used in illustrating this article.

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